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III

A CONTRIBUTION TO OUR KNOWLEDGE OF THE  
NESTING HABITS OF THE GOLDEN EAGLE

BY

JOSEPH R. SLEVIN

*Curator, Department of Herpetology*

Early in the spring of 1916, my friend, the late Dr. John Van Denburgh, announced to me that he was preparing to again take up one of his boyhood hobbies, and to build up his oölogical collection, which at that time, contained a representative series of sets of the birds around Los Gatos, the site of his father's home. He seemed to be greatly interested in securing eggs of the Golden Eagle (*Aquila chrysaëtos*), regarding which he had carefully studied the available literature. I was asked to accompany him on his collecting trips, as he was none too good a climber, though I must confess that I am far from being one myself. Our activities commenced in April, 1916, and extended through a period of years, to and including the spring of 1922. The following notes cover our observations upon seven pairs of eagles during that time, all within Santa Clara and San Benito counties, California. For convenience I shall designate by numbers the different pairs of birds with which we became acquainted.

January 29, 1929

*Pair Number One*

On April 30, 1916, we left San Jose quite early in the morning and motored to Almaden and then to the Uvas Creek country. Here, by the roadside, we met a small boy. Upon being asked if he knew where there were any birds' nests, he said that he did not, but did know where there was an eagle's nest! He agreed to show it to us, and said that his sister had one of the eggs. With the boy in the tonneau of our machine we quickly reached his home, where the egg was soon in evidence. It was a very handsome eagle egg, but blown through two large, irregular holes at its ends. A price having been agreed upon, Dr. Van Denburgh was in possession of his first egg of the Golden Eagle.

Taking the boy and his two brothers in the machine with us, we started for the nest. This, the boys said, had been found by their father's hired man, who climbed to it, took the two eggs, broke one in descending, and blew the remaining one. We crossed a low range of hills, and, as we were descending, the boys pointed out the nest, clearly visible from the well-traveled road, and but a few yards distant from it. It was indeed a surprise to us to find that the eagle had chosen a site so exposed to view and so close to human habitation. The large deciduous oak in which it was situated grows upon the side of a steeply-rounded hill, one of the first to rise above the level of the floor of the valley. Higher on the hill are a number of smaller white oaks and a little scattering sagebrush. The tree is a large one and originally had three main limbs, but one of these had fallen. Partly as a result of this mutilation, there are but few sheltering branches and the nest is but little hidden from view.

This nest, which I shall call No. 1a (plate 4, fig. 1), is built upon a horizontal branch close to one of the main limbs of the tree at a height of about 40 feet. It is not a very large one, quite shallow and about  $2\frac{1}{2}$  feet in diameter. We had heard that eagles sometimes lay a second set when their first eggs of the year have been taken, and we hoped that these birds had done so. With much slipping and sliding on the grass we climbed the hill until we were level with the nest, when from the top of a small oak we could look directly into

it, perhaps 50 yards away. Although we had seen the eagles circling about the neighboring hills, there were no eggs to reward us; the nest was empty.

We next visited it on March 2, 1917, when we found it apparently in good repair, but empty. No eagles were seen. We did not return until March 25, when we found it still unoccupied. The season being now well along, we decided that the birds did not intend to use the nest this year, and that they probably had another in the vicinity, although we had seen no eagles about. We determined to make a careful search, and, separating, went in different directions, where the large trees grew. Dr. Van Denburgh went over the hill immediately behind the old nest and a mile or more towards the north. He had not gone far when he flushed an eagle from one of the lower branches of a large oak, but, although he searched far and wide, could find no nest.

I, fortunately, was more successful. Crossing the road to a clump of large live oaks about half a mile to the south of the original nest, I found a large mass of sticks and branches which I thought might be an eagle's nest. Climbing to it, I found that it contained no eggs, but it seemed to be just ready for use, being lined with grass. This nest I shall call No. 1b (plate 4, fig. 2). No eagles were seen near it. Returning on March 31, we found the old nest (1a) still empty, but as we quietly passed under the new one (1b) and reached the trunk of the tree, we saw an eagle arise in the nest. When we spoke she sailed away. Climbing the tree I found one very light-colored egg. We left it, hoping for more. This nest was situated about 25 feet above the ground, and the climb was an easy one. It proved to be quite large, more than three feet in diameter, commanding a most extensive view toward the north and east. April 1 we returned to this nest just before dark. Again we found but the one egg and left it. April 6, 1917, found us back again. As the nest still contained only the one egg, we concluded that no more would be laid, and took it. Incubation was well begun. On April 24 both nests (1a, 1b) were empty.

Sunday, March 3, 1918, we went up to the highest point on the road. Leaving the machine there, we climbed the fence, walked across the pasture, and reached the tree which had

held nest 1b. Much to our surprise nothing remained of it except some scattered rubbish on the ground. Not a stick was to be seen at the site of the nest in the tree, although this nest had been a particularly large one and so firmly built that one could stand in it with perfect safety. Returning to the automobile we rode down the steep, winding road, and were soon close to nest 1a. Finding it unoccupied we left, having seen no eagles about.

We did not return again until April 7, when we arrived at nest 1a at 7:35 P. M. As we approached we heard a horned owl hooting, and soon saw it sitting in the eagle's nest. When we were quite close the owl flew. Climbing to the nest, I found nothing in it but a lining of lichen, which seemed to be fresh. No eagles were seen. On April 20 we again inspected this nest, but found it empty and saw no eagles or owls. On May 4 we found this nest still empty; nest 1b had not been rebuilt. We spent several hours thereabouts, but saw no eagles until just as we were leaving, when both birds appeared circling low over the hill behind the site of nest 1b. It is probable that they constructed another nest in the vicinity.

In March, 1919, nest 1a still remained, but 1b was entirely gone. One eagle was seen. This locality was not visited again until April 25, 1922. Nest 1a had disappeared. Careful and extended search revealed no nest although one eagle was seen two or three times during this visit, and also May 4, 1922.

### *Pair Number Two*

We became acquainted with this pair on the Johnson Ranch, about  $4\frac{1}{2}$  miles southeast of Hollister. This ranch, then farmed under lease by Joe Pacheco, lies on a series of low, rolling hills and is mostly grain fields and pasture with a few white oaks scattered about. As we approached the ranch we saw an eagle circling low over the hills perhaps a half a mile away. Through the hills winds a small stream known as Churchill Creek. At one point on this creek is a small clump of willows, and several of the oaks grow near it. We were told that many years ago the eagles had a nest (2a) in a large

white oak at the edge of this stream and perhaps a quarter of a mile from Pacheco's house and barns, a nest that was very difficult to reach owing to the great size of the tree. Finally, the tree fell and the eagles selected another large white oak on a hillside a few hundred yards away. Here they built anew, in a situation which commanded a much more extensive view than they could have enjoyed from their former site in the creek bottom, and it was to this nest that we were led March 3, 1917. I shall call it No. 2b.

Although no bird was flushed from the nest on our approach, preparations were under way to climb to it, when a new one was discovered near the top of a large oak some 200 to 300 yards away. This tree grew in the creek bottom, perhaps 20 feet from the stream, and close to a clump of willows at its edge. From the point at which we stood, near nest 2b, this new one, which I shall call 2c, looked like a huge brown ball near the top of the leafless oak. We walked across the pasture, and following a fence along the edge of a grain field, approached it. When we had reached the level ground on which the nest-tree grew, and were not more than 50 to 60 feet from it, the bird arose and flew silently away. We did not see it again.

This nest, 2c, is situated 45 feet from the ground. It rests firmly in a large crotch not far from the top of the tree, and is about  $2\frac{1}{2}$  feet in each of its dimensions. Our rope ladder was only 20 feet long, but it served to carry me past the most difficult part of the huge tree, my arms and knees carrying me up the remaining 25 feet. After some delay occasioned by the great size of the nest, the two eggs it contained were lowered, one at a time, with can and string, and when they reached the ground safely we rejoiced in the possession of a beautiful set of eggs of the Golden Eagle.

With our treasures safely packed, we walked back to the machine. On the way we met Pacheco, who told us that the eagles had used another nest (2b) in 1916. He said that he had taken a young eagle from that nest and kept it some time, but, as it would eat nothing but ground squirrels and had to have a squirrel every day, he soon tired of his pet and put it back in the nest, where, under the care of its parents, it completed its growth.

In the machine on the way back to town, our guide said that so far as he knew eagles never laid a second set the same year when their eggs had been taken, although they continued to use the same nest or nests during subsequent years. Notwithstanding this statement by one whose knowledge of eagles is great, we determined to investigate this matter ourselves, for we had heard rumors that eagles sometimes do depart from this rule. So, very appropriately as it turned out, the first of April found us back again on the Johnson Ranch.

Leaving the machine at the house, we walked up through the fields and met Pacheco. He said that the eagles were nesting again, that he had seen the bird a couple of days before on the nest where we had taken two eggs on March 3. We walked to the tree with high hopes of a second set. Armed this time with 50 feet of ladder, it was more easy to negotiate the climb. Alas for our hopes! I found it empty. We were about to conclude that we had come too soon, when, on the ground close to the trunk of the tree, we discovered what appeared to be the contents of a fresh eagle's egg. As there was no shell to be found and as we found nearby other unmistakable evidence of his activities, we were forced to conclude that we were too late instead of too early—that some other oölogist had been there just before our visit.

Two photographs of this nest (2c) were taken. One (plate 5, fig. 4) shows the general location in the tree and the situation of the latter, in a grain field, with a fence on one side, and Churchill Creek with its clump of willows on the other. On April first the leaf-buds were just swelling on the bare twigs and the nest was plainly visible from a distance. The second photograph (plate 5, fig. 3) was taken from the ground directly below the nest. It shows the arrangement of the great limbs and the huge nest resting on them where they fork.

Leaving this nest we went up the hill to examine nest 2b. On the way we found a sparrow hawk persistently sitting in a cavity in a white oak tree which recently had been chopped into, doubtless by our unknown fellow craftsman. Nest 2b showed no signs of recent occupation by the eagles. Its appearance is shown in two photographs taken April 1, 1917 (plate 5, figs. 1, 2). The large deciduous oak, with a trunk 13 feet in circumference at the base, is situated in a hillside



pasture, near a gully. The second photograph shows the nest and the twisted, rough-barked limbs. The nest is double, a more recent portion partly covering the older platform. We have since learned from Joe Pacheco that this nest (2b) was occupied later in 1917 and that one young eagle was reared there. If his observation and memory are correct this eagle must have made three layings that year.

Late in February of the following year, we again visited this region, but found that recent rains had made the roads so difficult to travel that we did not attempt to reach the Johnson Ranch at that time. Saturday, March 2, 1918, found us eating an early breakfast at Hollister. Leaving town at 7 A. M., a short drive through the rolling hills in the crisp morning air brought us to Pacheco's house. Leaving the machine near his barn we walked up Churchill Creek to nest No. 2c, from which we had secured a set of eggs the previous year, and arrived under it without having seen any eagles on the way. We put up the ladder and I climbed to the nest, finding it water-soaked and without any fresh lining, but otherwise in excellent condition.

We concluded that the eagles were probably using nest 2b, and, going up the hillside to examine it, reached the tree at 9 o'clock. We had been standing there talking for perhaps a minute when the bird slowly arose in the nest, seemed to step to its edge, and then sailed away. We did not see it again during this visit. With the aid of the ladder I quickly reached the nest and at half-past nine we had two nice eggs safely packed away. One, the lighter-colored egg, weighing  $4\frac{1}{4}$  ounces, was either fresh or infertile, while the more heavily blotched egg, weighing  $4\frac{3}{4}$  ounces, contained an embryo so well developed that eye pigment and small bones were evident on blowing it.

Still seeking to find whether or not these birds would lay a second set this year we left town on April 6, and, arriving at the Johnson Ranch at 5:45 P. M., we visited nest 2b. We walked under the nest and talked loudly, but the bird did not leave until we threw a clod up into the tree. Again she seemed to arise in the nest and step to its edge before sailing away. Rain began falling as we put up the ladder. Having secured a second set of two eggs, we were down and away at

6:35. The whiter egg of this set weighed  $4\frac{1}{4}$  ounces, while the more heavily blotched one was one-eighth of an ounce heavier. Both eggs contained small embryos, apparently of about the same age.

On Saturday, March 1, 1919, we again returned to the Johnson Ranch. In the distance we saw an eagle soaring. As we walked along Churchill Creek numerous mud-turtles slipped into the water from the opposite bank where they had been sunning themselves. The leaf-buds of the deciduous oaks were much more swollen than we had found them on March 3, 1917, or March 2, 1918, and altogether spring seemed somewhat earlier than in those years. We went at once to nest 2b, on the hillside; only to find it empty. There was no fresh lining and green grass six or seven inches tall was growing from it. This nest, as I have mentioned, is a double one, a newer portion resting in part upon an older one. The newer portion has diameters of about four or five feet, while the whole structure has a long diameter of more than seven feet and a depth of about five feet. The accumulation of such a mass of material must have required a great number of trips on the part of the birds. While we were examining this nest we saw an eagle flying away from the other one (2c). When first seen it was about 50 feet from the nest, but we had no doubt that it had just left it. As we were too far away to have frightened the eagle we concluded that it probably was engaged in repairing the nest. However, we thought it best to investigate.

We went down the hill and across the field. When nearly under the nest (2c) we whistled and shouted and clapped our hands until we felt certain that it was unoccupied. We then threw the weight over a limb about half way up to the nest and hauled up the rope ladder. Starting up the tree I reached a point about five feet below the nest, when the eagle arose, looked down at me, opened its beak widely, uttered a curious sort of hiss, stepped to the edge of the nest and flew off. Instead of going out of sight immediately, however, as these eagles usually do, this bird circled about within one or two hundred yards of us, so that we had an excellent view of its plumage. This seemed to be in fine condition, but was pale and quite grayish, especially about the head. We concluded



that this bird, which had just left the nest, was a very old female, but of course we could not be certain as to the sex. A few seconds later the mate appeared and both birds circled quite close to us. The second bird was much darker than the first. This was just the reverse of what we had observed at nest 3b on March 4, 1917.

The eagles circled about silently for a few minutes and then disappeared. Meanwhile, I had reached the nest and found that it contained two eggs. The nest seemed larger than it was two years before, doubtless growing with repairs. It had a depth of four feet, with horizontal diameters of four and four and a half feet, the nest cavity being about 18 inches in diameter and about six inches deep. It was freshly lined with grass. Resting on the top of the nest, at one side of the cavity, was a sprig of live oak covered with fresh green leaves. On our previous visits the nests of this pair of birds had not been decorated in this manner. We have found, however, fresh leaves in those of other pairs (see 3 and 5), and this habit of nest decoration or marking seems to be a common one. The two eggs, of quite different styles of coloration, were lowered to the ground and packed away. One is heavily blotched and resembles an egg of the second set of 1918. In the other egg the pigment is more evenly spread as a heavy suffusion about the smaller end. This egg is similar to one of the first set of 1918. The blotched egg weighed just  $4\frac{1}{2}$  ounces, while the other was about one-tenth of an ounce lighter. Incubation in the blotched egg had progressed so far that the eye pigment and vertebral cartilages were evident on blowing. The formation of the embryo had begun in the other egg, but was much less advanced, no eye pigment or cartilage having been formed.

On March 29, 1919, four weeks after collecting the set from nest 2c, we again motored to the Johnson Ranch, where we arrived about 6 P. M. Joe Pacheco came out to meet us, to report that he had seen the eagle on nest 2b about five days before, where she remained even when he rode under the tree. Nevertheless, he thought that we would find that she had not finished laying. We walked to the hillside tree without having seen an eagle, and no bird left the nest. On climbing up, it was found to contain one egg. The nest was lined with grass

and a twig of fresh eucalyptus leaves lay on it. We left it undisturbed and returned to the machine through a gentle shower of rain, the eagles still remaining unseen. On April 10, 1919, we returned. The single egg was found on end in a somewhat mussed and apparently abandoned nest. No eagles were seen. The egg is a very small one, weighing only 4.1 ounces, and was fresh.

We did not visit this pair of eagles again until March 13, 1920, when we arrived at the Johnson Ranch at about three in the afternoon. We went at once to the nest on the hill (2b), which we found unoccupied, thoroughly wet by recent rains, and showing no renewal of its lining. While I was at the nest one of the eagles came sailing over from the south, inspected us, and passed on toward the flat where the tree which contains the other one (2c) is situated. The eagle, however, did not visit that tree but sailed on out of sight to reappear later over the hill near nest 2b. Feeling reasonably certain that we would find something in nest 2c, we descended to the flat and walked over to the tree which contains the nest. Shouting and clapping failed to frighten any bird from it, but our experience in former seasons made us realize that eagles sometimes sit too persistently to be flushed this way, so we prepared to climb. While we were thus engaged two men rode up on horseback and said that they had seen an eagle carrying fresh green twigs to this nest two days before. We found that this observation on their part was probably correct, for on reaching it we were disappointed to find that it contained no eggs, although it had been freshly lined and held a number of fresh leafy twigs of eucalyptus. Only the one eagle was observed during our visit and we were in doubt as to whether the nest was about to be used or had already been robbed; or whether the old female eagle had met with some catastrophe and the green trimmings had been placed in the nest by the male, as in instances previously noted.

Circumstances prevented our return until February 27, 1921, when we found the nest on the flat (2c) unrepaired, while the one on the hill (2b) contained green leaves and fresh lining of dry grass not yet pressed into position. On March 18 both nests appeared as on March 6, except that the

green leaves in nest 2b were no longer fresh. One eagle was observed flying near on each of these visits.

Returning March 3, 1922, we found conditions as on February 27, 1921. The hillside nest (2b) contained unarranged fresh lining material of dry grass, fresh live oak leaves and a eucalyptus twig with fresh leaves. The lower nest (2c) was unrepaired. One eagle was seen soaring near. On March 19 the lining of dry grass in nest 2b was found pressed into a well-formed cavity. The green oak and eucalyptus leaves were still present and a small branch of wild rose, with the delicate fresh leaves just beginning to wilt, was in the nest. While it is possible that the nest had been robbed within a day or two, we were inclined to believe that eggs had not yet been laid. The season appeared to be very late.

April 4, 1922, we found both birds flying near the nest late in the afternoon. Returning to the ranch house we met Joe Pacheco, who said that on March 10 two men appeared at his house at 6 A. M. with two eggs which they had taken from this nest. April 15 we visited nest 2c and found it relined, with well-formed cavity and a branch of fresh eucalyptus leaves. This nest seemed just ready for use, but contained no eggs. On April 20 this nest (2c) was found in the same condition as on April 15, except that the green leaves were somewhat dried. On May 13 nest 2c was still empty. Nest 2b contained a small branch with fresh green leaves.

### *Pair Number Three*

Our experience with our second pair of eagles having increased our desire to know more of these birds, we gladly accepted the offer of our guide to lead us to other nests. On March 4, 1917, we set out in our machine for the Flint Hills. The road which we first tried was blocked by a deep mud-hole which we could not pass. Taking the main road to San Juan, we finally turned down a lane which led us to the flats by the river. The San Juan River here is quite wide. It did not, at this time, entirely cover its sandy bed. We removed our shoes and socks, rolled up our trousers and prepared to wade across. The water was quite shallow, nowhere more than a foot deep, but the sand seemed to "drop out" under our

feet, often letting us down another foot or more. As there had been a heavy frost during the night, the water was icy cold and we were indeed glad when we reached the opposite bank and could warm our aching feet.

The river here runs along the edge of the hills, which are furrowed by a number of small gulches or canyons. The hills are, in the main, bare pasture lands and grain fields, but here and there are a few trees, live and white oaks, which grow singly or in small groups, usually in the hollows or canyons. The first canyon we encountered held nothing of interest, so we passed on over a low hill to the second one. Well up on the side of this canyon stands a large, solitary live oak, and in the top of this tree, perhaps 30 feet from the ground, was an eagle's nest. It seemed not to have been used for some time, but was still fairly well preserved. I shall call it nest 3a.

Passing on over the hill to the next canyon, we came upon the eagle, sitting quietly on one of the posts of a wire fence, and but little disturbed by our presence. When we were quite near, it flew a short distance and lit on the ground, where it remained for some time. Our guide called our attention to its pale head and general coloration, saying that this pallor was characteristic of very old birds. On the floor of the canyon, close to the river, is a group of four or five large live oaks, and as we drew near we saw a nest well up in the tallest of them. We walked under the trees but not until we shouted and clapped our hands did the eagle leave the nest. Then she flew slowly and came to the ground near her mate on the hillside nearby.

This nest, which I shall call 3b, is one of the smallest we saw. It was about two by two and one-half feet in diameter and contained comparatively little material. It was built on the main trunk of the tree where the latter curves more or less horizontally and forks before turning upwards again. Its height above the ground was 35 feet. While preparing to climb up to it, we discovered on the ground underneath large pieces of shell of an eagle's egg. These fragments seemed to be but a few days old, for they were glazed with albumen. Our hopes of getting a nice set were considerably lowered, and our guide said it was hardly worth while to climb for one egg. However, I climbed to the nest and discovered that it con-

tained two beautifully marked eggs. These were so completely covered with eucalyptus leaves that I could not see them as I looked down into the nest. Two or three small eucalyptus trees growing on the bank of the river a few yards away furnished a ready supply of these leaves, but we were unable to understand the eagle's reason for using them in this manner. Also, we wondered about the broken egg on the ground. How did it get thrown from the nest? Should we otherwise have gotten a set of three eggs, or was the third egg laid to take its place? The eggs taken were both fresh.

April 1, 1917, found us again approaching the home of this pair of eagles. Nest 3a, on the hillside, appeared still in its somewhat dilapidated condition as we passed it. We had thought that the eagles might repair it and lay a second set there. Walking on, we soon reached the tree which contained the other nest (3b), from which we had secured eggs just four weeks before. Thus far we had seen no eagles, but when we shouted the eagle arose in the nest and, after a momentary pause, flew off over the hill. We did not see the bird again. Going up to the nest, another beautiful set of two eggs was found. It contained fresh eucalyptus leaves, as on our former visit, but the eggs were not completely hidden by them. Incubation had begun in one egg, while the other was fresh.

The following year, on Saturday, March 2, 1918, we returned to these nests. Nest 3a appeared much more dilapidated than in 1917; probably not more than half of it remained. The eagles evidently did not intend to use it. Nest 3b was reached shortly after and appeared just as it had in 1917. We saw no eagles but decided to climb to it. It was found apparently ready for use and contained two eucalyptus twigs covered with fresh leaves, the larger of them about a foot long. These we left undisturbed. There were no eggs.

Leaving this nest we walked over the hills and up a long canyon, toward the home of pair number four. The hills were bare and we passed very few trees on the way. A little after noon we came upon a large live oak growing on the side of the canyon, from which, when we had nearly reached it, a large eagle flew. Our first thought was that the eagles had moved up here from their old site near the river, but careful

search revealed no sign of a nest either in this tree or in others farther up the canyon. We returned to the nest by the river (3b) on March 16. It still contained the same eucalyptus twigs, somewhat dried, but nothing else, so it appeared that the eagles were not going to use it after all. The fresh leaves found March 2 had made us almost certain that they would. Our final visit to these nests, in 1918, was about four in the afternoon of April 6. No eagles were seen, but as we approached nest 3b a pair of Western Red-tailed Hawks (*Buteo borealis calurus*) circled about screaming. We found the nest had been newly lined with moss and contained two eggs of this hawk.

On March 2, 1919, we returned to the home of our third pair of eagles and found that not a stick remained of either nest 3a or 3b. In March, 1920, we looked again for a nest of this pair of eagles but were unable to find one. Only the old male eagle was seen. On February 27, 1921, we visited this locality again but there was not a trace of a nest in either tree. The old male was again seen.

On March 18, 1921, we determined to make one more attempt to find a new nest. Nothing had been done at either of the old nesting places, but in a small canyon between them we flushed the pale old eagle and his dark mate, both of which flew silently over the hill and disappeared. We looked again in every tree and found nothing in that canyon or elsewhere, until the search seemed hopeless. As a last chance we looked on a hillside, close to the road, where there were a few trees so small that it had seemed useless to examine them, and here we found a large nest only 25 feet above the ground (plate 4, fig. 3; plate 6, fig. 1). The tree showed unmistakable signs of having been climbed recently, so we were not surprised to find the nest empty.

March 3, 1922, found us again approaching this nest (3c). When distant about a third of a mile, we observed a large bird perched on the top of the tree which contained the nest. We had covered half this distance when the bird, which proved to be the pale old male, flew down close to inspect us. He then flew back over the tree and disappeared beyond. When we arrived within 50 yards of the nest the dark female arose



from the nest and quickly flew from view. An easy climb revealed two beautifully marked eggs resting on a fresh lining of dry grass. The nest, constructed of oak branches and twigs, is about three by four feet in diameter and two feet deep, its cavity being about five inches below the rim. The tree is a small white oak. Both eggs were perfectly fresh. One is almost covered with red pigment and weighed  $4\frac{1}{2}$  ounces. The other egg is white with a few small blotches at one end and weighed  $4\frac{3}{8}$  ounces. These eggs are of the same type as those secured in 1917, and probably were laid by the same dark female. This nest may have been built in 1918 and overlooked by us because of its improbable situation.

April 4, 1922, we found this nest (3c) empty and no eagles in sight. After photographing it we went on and examined the trees where the other nests had been, but found nothing. The old male flew near us when we were close to the site of the nest 3b. On April 20 we returned and again found nothing at the sites of any of the nests we had seen previously. One old eagle flew by while we were near nest 3b. We gave up the search and went on to examine a Red-tail Hawk's nest farther down the river. About an eighth of a mile beyond the location of nest 3b we found a large nest about 35 feet up in an old cottonwood tree. On looking closely we made out the tail and wing tips of a large bird protruding over the edge. On the ground below we found a number of dead sticks and twigs and a sprig of fresh, green, live oak leaves. After we had shouted and clapped our hands the eagle left and sailed away. Returning a half hour later we found the eagle again on the nest, this time faced in the opposite direction, and, as before, she left with reluctance. We found the nest (3d) to be about three feet in diameter and a foot and a half high, lined with dry grass on which lay two eggs. The blotched egg weighed  $4\frac{5}{8}$  ounces, the yellowish one  $4\frac{3}{8}$  ounces. Both were moderately advanced in incubation, the leg bones being about a half inch in length. June 3, 1922, we again visited this nest (3d). Both this nest and No. 3c were empty, and no eagles were seen about them or at the site of nest 3b.

*Pair Number Four*

Our acquaintance with our fourth pair of eagles began on the afternoon of March 4, 1917. Leaving the home of pair number three, we turned from the river and went over the hills and up a long narrow valley, where there were few trees. On went our guide up the valley, and then, turning to the left over a bare hill, he led us into a deep gulch with numerous large live oak trees. He went directly to one of the largest of these, and following him we saw a huge nest built far out on a nearly horizontal limb some 40 feet above the ground. A few moments' inspection sufficed to show us that the eagle's nest, which I shall call 4a, was not occupied.

Two or three hundred feet farther up the gulch we found a still larger tree. Fifty feet from the ground was another large nest (plate 7, fig. 3), again built well out on a horizontal limb, and we could just see the eagle crouching low upon it. Soon she arose and flew away. As our ladder was not long enough to reach it we resolved to return later to this nest, 4b.

Accordingly, a week later, on March 11, we again tramped over the hills to this gulch, but this time from another direction. On the way over, in a large live oak tree on a hillside near the lower end of this gulch, we found the remains of a still older eagle's nest, one that evidently had not been used for many years. As it was not more than a quarter of a mile from those in the gulch above, it was probably built by the same birds. I shall call this nest No. 4c. It was about 30 to 35 feet above the ground. When we arrived at nest 4b the old eagle was not at home; the nest contained two large, pale eggs. This nest was three feet in diameter and lined with dry grass. The eggs were not covered. Incubation had been well begun in both. We saw one eagle in the distance, circling over the hills. On April 15 we returned, but found the nest empty and no eagles visible. This ended our observations for the year.

On March 2, 1918, we arrived at nest 4b. It seemed to be in good repair, so, although we had seen no eagles, we decided to make the climb. It was found to be empty and showed no preparation for use. Nest 4a was much more dilapidated than a year before, and of nest 4c there now remained only a few

sticks. Leaving this gulch, we wandered up a long canyon running towards the northwest. After we had traveled a mile or more, we saw what we thought was a Red-tailed Hawk's nest in a small tree well up on the steep south side of the canyon.

We climbed up hill until we were above the nest and could look into it. It contained no eggs, but a lot of downy feathers were sticking to the twigs and branches of which it was made. We saw no birds about and left convinced that this was a hawk's nest and would soon contain eggs. We returned to this nest (4d) March 17, 1918. Having found nest 4a still unrepaired and 4b still unoccupied, we went to the canyon towards the northwest, expecting to collect a set of Red-tailed Hawk's eggs from the nest found two weeks before. We walked up the bottom of the canyon and then straight up the side of the hill to the nest. When we had approached within about 40 feet of it, a beautiful, dark-plumaged eagle arose and sailed away. We could hardly believe our eyes, for it did not seem reasonable to find so large a bird on so small a structure, and we had no idea that it could be other than that of a Red-tailed Hawk.

This nest was built at a height of about 18 feet, in a small deciduous oak which grew well up on the steep side of the canyon. The situation of the tree made the nest seem quite high and the view from it was very extensive (plate 4, fig. 4). Climbing higher up on the hillside, we were able to look into the nest and to see that it contained two eggs. There was much more down in and about it than we had seen in any other eagle's nest. On the ground below the tree was a lot of débris, either material wasted during its construction or the remains of some earlier platforms.

The two eggs which this nest contained were unusually large. The only other eggs which we had taken before were those secured from nest 4b on March 11, 1917. Because of similarity in size of the eggs and because the nests are only about a mile apart we concluded that they belonged to the same pair of eagles. The two eggs taken March 17, 1918, are very dissimilar in appearance. One is quite heavily blotched. The other is entirely white, except for a few faint markings which may be either nest stains or very slight pigmentation.

The blotched egg weighed just five ounces, while the white one weighed just a quarter of an ounce less. Both eggs were fertile, and in both incubation was well advanced, but more so in the blotched egg. This would indicate that in this instance the egg first laid was larger and more heavily pigmented than the second one. Our last visit during 1918 was on April 7, when we found all three nests (4 a, b, d) unoccupied.

On the second of March, 1919, we returned and found nest 4a represented by a mere hatful of sticks. Nest 4c had entirely disappeared. Nest 4b, where we secured eggs in 1917, was not reduced in size, but looked ragged and deserted. Having made sure that it was not occupied, we left without climbing to it. Looking back we saw two eagles circling over the hill beyond. We did not visit nest 4d, which had contained eggs the previous year.

On March 16 we returned for the purpose of inspecting nest 4d. As we approached the nest an eagle circled down towards us, coming quite close three or four times, and then flew farther up the canyon. Nest 4d was empty and showed no signs of occupancy. As we walked up the canyon the eagle again appeared but quickly passed from view. Two weeks later, March 30, we returned to this canyon and looked for a new nest but found none, although we saw an eagle leaving the canyon as we entered it. Nest 4d was empty and un-repaired.

The following year on March 14, 1920, we climbed up over the hill from the south and entered the canyon within 100 yards or so of nest 4d. An eagle appeared from somewhere near us, and, apparently in a state of excitement, crossed to the opposite side of the canyon, where it lit upon the ground. We found nest 4d deserted and much the worse for wear, but although we searched carefully we could find no other in the canyon. We did not visit the other canyon, where nests 4b and 4c were located. In 1921, the site of nest 4d was visited and the last remnants of the nest found on the ground under the tree. Search revealed no other in this neighborhood although one eagle was seen.

On March 2, 1922, we again entered this canyon from the west. Approaching nest 4b, we flushed the eagle. The nest was found to contain one egg, which we left undisturbed. Ten

days later, March 12, we returned to nest 4b hoping to find two eggs, but fresh marks of climbing-irons showed that we were too late. As we departed, an eagle circled about us several times, 50 to 60 feet above our heads.

#### *Pair Number Five*

On Sunday, March 11, 1917, we arose early and, having had breakfast, were a few minutes later on our way in the automobile, bound for the Flint Hills. In the first canyon that we entered we came upon a screaming pair of Red-tailed Hawks and soon found their nest. It was situated well up in a large oak tree in a position which made it difficult of access. We decided a visit to it would take too much time, so proceeded on our way.

Perhaps a mile farther on we came to another canyon with a considerable growth of live oak trees. We were walking along the edge of this canyon, seeking an easy place to cross, when an eagle suddenly flew from a small tree on the opposite bank at a distance of perhaps 40 yards from us. A second glance showed us a nest, from which the eagle had flown. The tree is a small one, and the nest only 25 feet above ground at its base, but the fact that the tree grows close to the edge of the bank of the canyon adds 30 to 40 feet to the apparent height of the nest. The eagle silently disappeared down the canyon, and did not return while we were about. We scrambled across the canyon and around on the bank above, taking a picture from a point nearly level with the nest.

The climb to the nest was an easy one. It was lined with dry grass and some gray moss, and contained two well-blotched eggs. It was very large and probably had been in use many years. I shall call it nest 5a (plate 6, fig. 2). Incubation was well started in both eggs. On the afternoon of April 1 we returned to the nest of our fifth pair of eagles. This we found empty, though its lining was in good order, as if ready for a second set. One eagle flew down the canyon while we were there. In consequence, we made a final visit on April 15, but found the nest empty.

The following year we returned to this nest (5a) on March 3, 1918. The eagle left the nest as we approached. Two

beautifully marked fresh eggs rewarded us. These are of the same type as those secured the previous year but are more heavily blotched. The one having the larger blotches weighed 4.9 ounces, the other 4.8 ounces. The freshly blown shell of the first egg weighed  $\frac{3}{4}$  oz. On March 17, just two weeks later, we were again in this canyon. No eagle left the nest. From the hill above we saw a whitish object in the nest, but were not certain what it was. Climbing to the nest, one very dirty, weather-stained egg was found. The nest was wet and disordered and seemed deserted. We concluded that the egg was part of the first set and probably had been laid soon after our visit of March third. The egg weighed 4.7 ounces, and was fresh. On April 7, 1918, this nest was empty. We saw one eagle fly down the canyon.

March 2, 1919, we arrived at this gulch in the morning during a heavy shower. The eagle was not on the nest. I climbed up to it and found that it contained a lot of fresh lining materials, dry grass and lichen, not yet arranged and packed down. There were also a few small twigs of live oak with fresh green leaves. It appeared certain that the nest would be used later. We left without seeing any eagles, but on returning late in the afternoon, when the sky had cleared, we found them both flying over the canyon. On March 16 we again visited this nest. Arriving at noon, we walked across the pasture, where for half a mile we could be seen from the nest. We crossed the canyon within 100 feet of it, shouted, and clapped our hands. Climbing up on the bank above the nest we tried to look through the branches. We concluded that the nest was empty but decided to climb up to it. Just as I reached the base of the tree, off flew the eagle and silently disappeared. I found two eggs lying in the central cavity of the nest, which was lined with lichen with an inner layer of green live oak leaves. The cavity measured about 12 by 15 inches, with a depth of about four inches. The whole nest had diameters of five and four and one-half feet, and was about two feet deep. The egg which is more heavily marked at the small end weighed 4.25, while the other weighed 4.05 ounces. Incubation had just begun in the heavier egg. The lighter one was fresh.



On March 13, 1920, we again visited the canyon occupied by pair number five. An old eagle almost immediately flew up the canyon, passing over the nest on the way. We walked over toward the nest and crossed the canyon at the usual point, talking and shouting as we went. Then we climbed the hillside to a point just above the nest and perhaps 50 feet from it. Standing here, we could see the eagle sitting on the nest and watching us. As we walked closer, she arose and flew silently away. On climbing to the nest it was found to contain two eggs, which were considerably nest-stained and much less handsomely marked than any previously obtained from this pair. The nest was lined with grass and a few green oak leaves.

In March, 1921, this nest showed no signs of repair or occupancy, and, although one eagle was seen flying in the canyon, no other nest was discovered. On March 2 and 12, 1922, careful examination of this canyon revealed no new nest, although one eagle was seen. The old nest was unrepaired and seemed deserted.

### *Pair Number Six*

Our friend and guide had told us of another nest which, to his personal knowledge, had been used by the eagles for 30 years, though during this period there were some years, he believes, when they did not lay in it. He visited this nest with his son on March 11, 1917, and secured two eggs in which incubation was fairly well advanced. Unfortunately one of these eggs was broken, but the remaining one he gave to Dr. Van Denburgh. This egg is of a type quite different from those of any other pair of birds investigated by us. On April 15, 1917, we visited this nest (plate 6, fig. 3). It is built in a great live oak which grows well up on the south side of a deep gulch, about  $1\frac{1}{2}$  miles south of Sargents. The main road, about 300 yards away, may be seen from it. It was nearly dark when we reached the foot of this tree, but we soon convinced ourselves that it was not occupied.

The next year, 1918, we returned to this nest, which I shall call 6a, on the morning of February 22. It appeared to have

been damaged by the winter storms, and a considerable portion of it was on the ground. No eagles were about, and we concluded that the birds did not intend to use it. We climbed to the top of the hill and went down another canyon, which we thought would lead us to nest 5a. We had walked perhaps half a mile when, as we had expected, Dr. Van Denburgh pointed out a nest, some 300 yards ahead of us. At that distance it could not be seen clearly, but I had scarcely time to say that I thought it was the nest with which we were familiar when we saw an eagle leave it and fly off over the hill. As we drew nearer the situation looked less familiar. The trees seemed much too large and the bank too low according to our memory of nest 5a. However, it was not till we reached the base of the tree that we recognized it to be one in which we had found the nest of a Red-tailed Hawk in 1917. Nest 5a was in another canyon about a mile beyond. The hawk's nest had entirely disappeared; not a stick of it remained. The eagle's nest was a few feet higher in the tree and was built on much larger limbs. On the ground below were numerous dead oak branches and twigs, evidently dropped in constructing the nest. The structure seemed large enough to have been in use several years, yet we knew it to be a new one, as there had been none there the year before. From the fact that the bird left while we were still so far away, we concluded that she had not laid, and that she probably was completing the lining of the nest when we discovered her. We left without climbing to the nest, which I shall call 6b.

On March 3, 1918, we returned, arriving under the tree at 8 o'clock in the morning. The bird was at home and did not fly until we threw a stick up into the tree, but there were no eggs. We then walked on to the next canyon to inspect nest 5a. Returning later to nest 6b we found no eagle on it. Two weeks later, March 17, we found no eagle at nest 6b. Climbing up to the nest it was found to be still empty. We did not return again until April 7. Nest 6a was ragged and deserted. Nest 6b was empty, but on the ground beneath it we found the remains of a broken eagle's egg.

The season now was so far advanced that we had no further expectation of adventures with eagles. We had, however, found the nest of a Red-tailed Hawk near the upper end

of this canyon and decided to visit the canyon again in hopes of getting a set of eggs. Therefore, April 20 found us again in this canyon. As we passed under the eagle's nest (6b) we noted that it was unoccupied. Some 300 yards up the canyon, an eagle circled down towards us, and then turned and flew away. We went on to the Red-tail's nest, found it empty, and returned to the place where we had seen the eagle. A little higher on the hillside is a group of large live oaks. We had examined these trees several times in 1917 and 1918 and were certain that there was no nest in them. However, we had scarcely entered this little grove when we saw a big nest well up in one of the largest trees, and, as soon as we clapped our hands, off went the eagle. On climbing to the nest I found it to contain a nice pair of eggs. Incubation was well advanced. I shall call this nest 6c. These eggs, taken from nest 6c on April 20, 1918, are of the same type as those secured March 11, 1917, from nest 6a. The fragments of an egg found under nest 6b also were of this type. It is probable that this pair of eagles deserted their old nest and moved a mile or more to another canyon, where they not only laid twice, but actually built two nests.

Returning in 1919, we examined these three nests (6a, b, c) on March 1 and 2. All three looked deserted. I climbed to nest 6c only, which was found empty and unrepaired. It measured about five by three and a half feet over all, and about two feet in depth. We saw no eagles in either canyon. On March 16 we returned and photographed these nests. Nest 6a is shown well out on a nearly horizontal limb which hangs over the canyon. Nest 6b (plate 7, fig. 4) may be seen well up in a large live oak which grows from the side of another canyon. As we entered the lower end of this second canyon, on the morning of March 16, we saw two eagles soaring well up in the canyon near the group of trees in which nest 6c is located. This group of live oaks is shown in the photograph (plate 6, fig. 4). The nest does not show. It is near the top of the tree and at the extreme right of the central group. The eagles quickly disappeared, and we found these nests (6b, c) still unrepaired.

After making a wide circle over the hills we entered the upper end of the first canyon, in which nest 6a is located. This

canyon near its upper end, high on the hillside, becomes broad and shallow and has but few trees. As we walked down the canyon an eagle circled to meet us and then sailed off towards the left. Lower in the canyon are many trees, growing in two main groups that are separated by an area of open pasture. Nest 6a is in the lower group of trees. We had searched through the upper group twice in 1918 and were certain there was no nest there in March of that year. We now decided to search both groups again, and Dr. Van Denburgh started for the upper grove while I set out for the lower one. We had walked only a few yards when Dr. Van Denburgh saw the eagle sweep down close to a large tree near the edge of the upper group, and a few moments later he saw a nest in the tree. As he called me, a second eagle left the nest; both birds departed silently and we did not see them again.

The tree is a large one but so well provided with branches that the 40-foot climb was not difficult. I soon reached the nest, looked over the edge, and with some excitement reported three eggs. I shall call this nest 6d (plate 7, fig. 1). It was very large, about  $3\frac{1}{2}$  feet deep with extreme diameters of about six and five feet. Its central cavity, about a foot in diameter and seven inches deep, was lined with dry grass, and held also a cluster of fresh oak leaves. The eggs are rather small and elongate, of the same type as those taken from nest 6c in 1918, but much more beautifully blotched. They weighed 4.02, 4.01 and 3.99 ounces, respectively. The egg with the greatest weight was most heavily pigmented, and the lightest one least so. The lightest egg was infertile. Incubation in the other two eggs was well advanced, but had progressed further in the heavier egg, in which the bones were quite firm. From conditions in this set it would seem that the first egg laid is the largest and most pigmented.

March 14, 1920, we again returned to the haunts of this pair of eagles, and ascending the canyon which contains nests number 6a and 6d, both were found unoccupied and showing no evidence of any repairs having been made. The former was very dilapidated, and the latter had been twisted out of position by the winter storms. One eagle was observed soaring over the top of the hill, but nowhere in the canyon did we find any other evidence of occupancy. This being so, we de-

cided to see whether or not the eagles had moved back to the second canyon, in which nests 6b and 6c had been built during 1918. From the opposite side of the canyon nest 6b appeared to be in excellent condition, but although we shouted and clapped our hands, no bird left it until we crossed the canyon, when the eagle quietly arose and flew away. We did not see the bird again. After some delay and difficulty the nest was reached and found to contain a set of three poorly marked eggs of the same general type as those secured from this pair in previous seasons. As we were successful here, we did not visit nest 6c.

None of the nests of pair six showed any signs of repair or occupancy when visited by us in 1921, and no new nests were found. On March 2, 1922, nest 6d contained dry grass not yet pressed into shape. While descending the canyon we found a nest which we were quite certain must have been built since our visit in March, 1921. On climbing to this one, 6e, I found it to be in poor shape and unlined. One eagle was seen flying about at the lower end of the canyon. Nest 6b was found to be in a good state of preservation, but unrepaired. There was no nest at the site of nest 6c. On March 12 conditions were unchanged at nests 6b, d, and e. On March 18 there was no change in the lining of nest 6d, and 6e seemed unoccupied. On April 15 and 25, 1922, nests 6d and 6e were unoccupied and no eagles were seen.

### *Pair Number Seven*

About two o'clock in the afternoon of March 3, 1922, Dr. Van Denburgh and I arrived at the foot of a steep hill three and a half miles northwest from the town of San Juan. At the top of this hill rises a huge rock about 140 feet high, the upper portion of which forms a perpendicular cliff 95 feet high, facing a little west of north. Fifty feet below the top of this cliff is a recessed ledge upon which we had seen a nest two years before. The top of the rock is nearly level, and its southern end is buried in the earth of the hill-top, so that one can easily walk out to the brink of the precipice (plate 7, fig. 2). The earth hill itself is quite steep. We spent 45 minutes

climbing to the top, and only 15 minutes returning to the automobile.

Just below the top of the hill we flushed a large dark eagle from the ground. At the base of the rock, below the nest, we found a number of dead oak branches and twigs, the freshly broken ends of which showed that they had been brought to the nesting place very recently. We lowered the rope ladder from the top of the rock until it hung directly in front of the nesting ledge. When the bottom of the 50-foot ladder reached the foot of the cliff the top of the ladder was about five feet above the nest. About 15 feet up from the bottom of the cliff is a ledge upon which two men can stand. We both climbed to this ledge and Dr. Van Denburg held the ladder while I climbed the remaining 30 feet to the nest. It proved to be a large one, about four by five feet, and freshly lined with dry grass, which had not yet been arranged and pressed down to form a cavity. As I descended I noticed old holes which had been drilled in the rock near a cleft which extended up from the ledge on which we stood. Later we noticed little steps cut in the rock below this ledge. These holes and footholds lead us to believe that this is the same nesting place that was robbed by J. R. Chalker in 1887 and 1888, as described in "The Ornithologist and Oologist" (XII, No. 6, 1887, pp. 86-88; XIII, No. 8, 1888, p. 120).

On March 12 we visited this nest again and took photographs of the rock. One eagle soared about the hill and rock as we approached, and at one time flew within a few feet of the nest. This was found to be in much the same condition as on March 3. We returned on March 18. As we drew near, an eagle left the nest and disappeared over the top of the hill. Having climbed to the nest I discovered one beautiful egg rather evenly covered with small red spots. The dry grass had been smoothed and pressed down, forming a slight central cavity. The nest was without any down or green decorations. We departed again without seeing the eagle.

April 4 we returned to the rock. When we were about 100 yards away the eagle left the nest and silently flew straight down the valley. We found but the one egg, evidently a complete set. This egg weighed  $4\frac{1}{2}$  ounces. Incubation was well begun, small bones being just distinguishable on blowing.



On May 4, 1922, we found this nest, which I shall call No. 7a, empty, and no eagles about. This proved to be our last journey in quest of the eggs of the Golden Eagle.

*All of the eggs mentioned in this paper and tabulated below are now in the collection of the California Academy of Sciences.*

Museum Number	Field Number	Number of Eggs in Set	Date Collected
4643.....	1a.....	1.....	March ?, 1916
4649.....	1b.....	1.....	April 6, 1917
4650.....	2b.....	2.....	March 2, 1918
4654.....	2b.....	2.....	April 6, 1918
4660.....	2b.....	1.....	April 10, 1919
4644.....	2c.....	2.....	March 3, 1917
4656.....	2c.....	2.....	March 1, 1919
4645.....	3b.....	2.....	March 4, 1917
4648.....	3b.....	2.....	April 1, 1917
4663.....	3c.....	2.....	March 3, 1922
4665.....	3d.....	2.....	April 20, 1922
4646.....	4b.....	2.....	March 11, 1917
4651.....	4d.....	3.....	Mar. 3-17, 1918
4647.....	5a.....	2.....	March 11, 1917
4652.....	5a.....	2.....	March 17, 1918
4657.....	5a.....	2.....	March 16, 1919
4661.....	5a.....	2.....	March 13, 1920
4662.....	6b.....	3.....	March 14, 1920
4655.....	6c.....	2.....	March 20, 1918
4658.....	6d.....	3.....	March 16, 1919
4664.....	7a.....	1.....	April 4, 1922